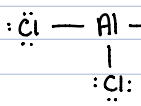
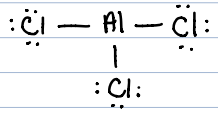
1. $AlCl_3$

① Lewis Structure

- Total v.e⁻ = 24
- Skeleton + octets



- remaining = 24 − 24 = 0
- tagging



VSEPR formula: AX_3

② Identify the number of σ bonds and lone pairs on central atom.

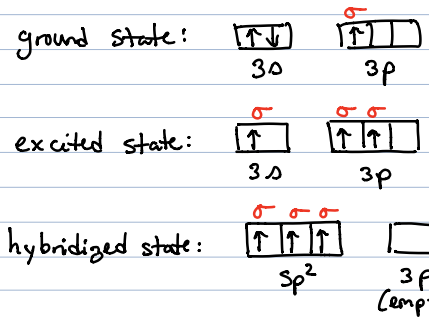
- # σ bonds = 3
- # lone pairs on central atoms = 0

③ Identify # of hybrid orbitals we need.

- # σ bonds + # lone pairs = 3 + 0 = 3

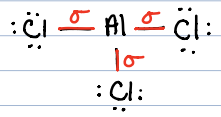
④ What happens:

Al



* Combining: s + p + p

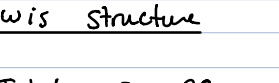
* Where are the σ bonds?



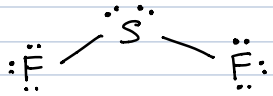
2. SF_2

① Lewis Structure

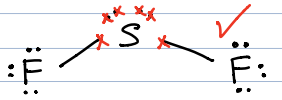
- Total v.e⁻ = 20
- Skeleton + octets



- remaining = 20 − 16 = 4



- Tagging



② Identify the number of σ bonds and lone pairs on central atom.

- # σ bonds = 2
- # lone pairs on central atom = 2

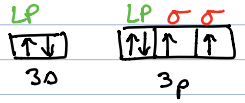
③ Identify # of hybrid orbitals we need.

- # σ bonds + # lone pairs = 2 + 2 = 4

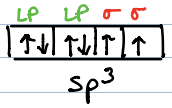
④ What happens:

P

ground state:

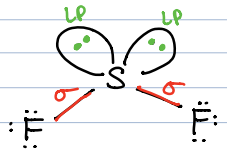


hybridization stack:



VSEPR formula: AX_2E_2

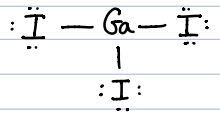
* where is the lone pair and where are the σ bonds?



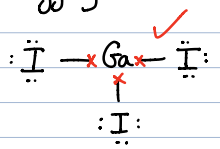
3. GaI_3

① Lewis Structure

- Total v.e⁻ = 24
- Skeleton + octets



- remaining = 24 − 24 = 0
- tagging



VSEPR formula: AX_3

② Identify the number of σ bonds and lone pairs on central atom.

- # σ bonds = 3
- # lone pairs on central atom = 0

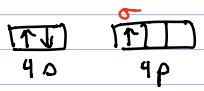
③ Identify # of hybrid orbitals we need.

- # σ bonds + # lone pairs = 3 + 0 = 3

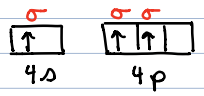
④ What happens:

B

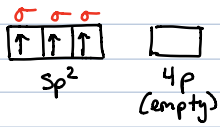
ground state:



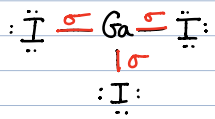
excited state:



hybridized state:



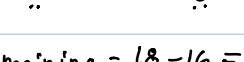
* Where are the σ bonds?



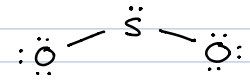
4. SO_2

① Lewis structure

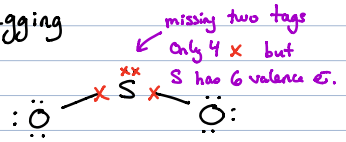
- Total v.e⁻ = 18
- Skeleton + octets



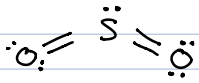
- remaining = 18 − 16 = 2



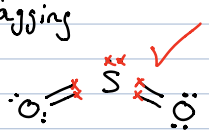
- tagging



- Adding multiple bonds



- Tagging



② Identify the number of σ bonds and lone pairs on central atom.

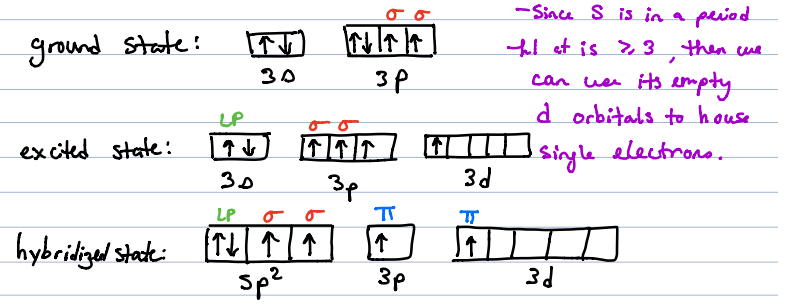
- # σ bonds = 2
- # lone pairs on central atom = 1

③ Identify # of hybrid orbitals we need.

- # σ bonds + # lone pairs = 2 + 1 = 3

④ What happens:

B



- need to excite in order to get single electrons to share with oxygen (2e⁻ shared with each)
- Since S is in a period +1 at is ≥ 3, then we can use its empty d orbitals to house single electrons.

VSEPR formula: AX_2E_1

* Where are the lone pairs, the σ bonds, and the π bonds come from: